THIN, MESHY POROUS BODY AND METHOD OF MANUFACTURING THE POROUS BODY

Technical Field

The present invention relates to a thin meshy porous body which is made of a metal, a resin, or paper, and which may be used as a core member for a battery electrode, various filter members, or the like, and also to a method of manufacturing such a thin meshy porous body.

Background Art

Conventionally, as a thin meshy porous body which is made of a metal, and which is used as, for example, a porous electrode core member for a nickel-metal-hydride battery or the like, or various filter members such as an air filter or an oil mist filter, ~~there are~~ a perforated metal and a foamed metal are used.

In a perforated metal, the framework is formed by a pressing process. Therefore, a perforated metal has merits in that its tensile strength is high, that the framework is firm, and that its continuous processing property is excellent. By contrast, perforations are two-dimensionally formed, and, when a perforated metal is used as a core member for a battery

manufacturing a thin meshy porous body made of a metal, a resin, or paper which can continuously process a long thin porous body.

Summary of The Invention

~~Disclosure of Invention~~

In the thin meshy porous body of the invention, front and rear faces of a thin plate member of a metal, a resin, or paper are embossed so that concave and convex portions of a conical shape such as a pyramidal shape or a circular conical shape are opposite to each other, and an opening is formed in a tip end of each of the convex portions in at least one face.

In the thus configured thin meshy porous body, because of the conical concave and convex portions which are formed in the front and rear faces so as to be opposite to each other, and the openings disposed in the tip ends of each convex portion in at least one face, a section has a three-dimensional structure, the porosity is high, and the framework is firm although the body is a very thin plate and has a reduced weight. Because of the conical concave and convex portions, it is possible to obtain a porous body having minute pitches and minute openings.

When the thin meshy porous body made of a metal which has a three-dimensional structure and a high porosity, which is a very thin plate, and which has a reduced weight is used as a porous electrode core member for a nickel-metal-hydride

it is possible to continuously process a long porous body.

Brief Description of the Drawings

Fig. 1 is a plan view of a part of a porous body.

Fig. 2 is an enlarged plan view of a part of the porous body.

Fig. 3 is a section view taken along the line A-A in Fig. 2.

Fig. 4 is a section view taken along the line B-B in Fig. 2.

Fig. 5 is a front view of a pair of embossing rolls which are used in a method of manufacturing the porous body.

Fig. 6 is a section view of opposed portions of the pair of embossing rolls shown in Fig. 5.

Best Mode for Carrying Out the Invention

In a thin meshy porous body 10 made of a metal according to the present invention, as shown in Figs. 1 to 4, the front and rear faces of a thin plate member 11 of a metal such as iron, stainless steel, nickel, copper, or aluminum are embossed so that concave and convex portions 12 and 13 of a conical shape such as a quadrangular pyramid, a triangular pyramid, or a circular cone are opposite to each other, and an opening 14 is formed in a tip end of each of the convex portions 13 in at least one face as shown in the illustrated example. The po-

rous body exhibits a mesh-like shape as a whole. Alternatively, the opening 14 may be formed in a tip end of each of all the convex portions 13 in both the front and rear faces, not only of the convex portions 13 in the one face.

The thin plate member 11 has a thickness of 80 μm or less, preferably 10 to 50 μm. In the illustrated example, the opening 14 of each of the convex portions 13 is formed into a substantially square shape. In this case, the longitudinal length (Y) is 360 to 510 μm, the lateral length (X) is 365 to 510 μm, and the opening ratio is 45 to 60%.

The metal porous body 10 is manufactured in the following manner. As shown in Figs. 5 and 6, the thin metal plate member 11 is interposed between a pair of upper and lower embossing rolls 16 and 17 which are rotated in opposite directions in a state where many conical projections 15 formed on the surfaces of the rolls are engaged with each other, to emboss the front and rear faces of the metal plate member 11 while pressingly feeding the plate member, so that the conical concave and convex portions 12 and 13 are opposite to each other, and at the same time the tip end of each of the convex portions 13 in at least one face is broken through by the tip end of the corresponding conical projection 15 to form the opening 14 in the tip end of the convex portion 13.

The conical projections 15 formed on the embossing rolls 16 and 17 are shaped into a quadrangular pyramid, a triangular

Example 6

In the metal plate member 11 having a thickness of 20 μm made of a rolled copper foil, the front and rear faces are embossed so that the concave and convex portions 12 and 13 having a quadrangular pyramidal shape are opposite to each other, and the opening 14 having a substantially rectangular shape is disposed in the tip end of each of the convex portions 13 in only one face. In this case, with respect to the diameter of the opening 14, the longitudinal length (Y) is 509.8 μm, the lateral length (X) is 507.3 μm, the opening ratio is 54.28%, and the thickness (H) after the process is 485.4 μm.

~~Industrial Applicability~~

The thin meshy porous body of the present invention can be suitably used as a core member for a battery electrode, various filter members, or the like.

According to the method of manufacturing a thin meshy porous body of the present invention, thin meshy porous bodies can be easily mass-produced by continuous processing.

ABSTRACT

~~This invention provides a~~ A thin meshy porous body ~~which is~~ made of a metal, ~~a~~ resin, or paper, and which may be suitably used as a core member for a battery electrode or various filter members is provided. Front and rear faces of a thin plate member are embossed so that concave and convex portions of a conical shape are opposite to each other, and an opening is formed in a tip end of each of the convex portions in at least one face.